

# **PROGRAMMA DI FISICA- PHYSICS**

## **Classe 1E**

a.s. 2021-2022

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Libri adottati:

“Complete Physics for Cambridge IGCSE, third edition” di S.Pople ed. Oxford University Press

“Complete Physics for Cambridge IGCSE Workbook” di S. Lloyd ed. Oxford University Press

“I colori dell’universo” Bocci-Malegori-Poli DEA Scuola

### 1. Introduction to physics

o Scientific method: induction and deduction

o Historical period of physics: classical physics, modern physics, contemporary physics o Science and technique

### 2. Making measurements

o Standard form, mixed form

o International System of units of measurements: fundamental units of measurements, definition of meter, kilogram and second

o Time interval, length, area, volume and density. Definition of litre.

o Conversion among different units o Measuring instruments: sensitivity and capacity

o Vernier callipers

o Absolute errors, relative errors

o Mean value

o Significant figures and rounding: measurements with errors

o The parallax error

o Direct and indirect measurements

o Error on sum, difference (composition rule),

o Error on product and ratio (using the number of significant figures)

### 3. How to prepare a laboratory report

o Aim of the experiment

o Instruments and materials

o Procedure

o Data taking

o Data analysis

o Conclusions including sources of error

### 4. Representation of data and phenomena

o How to read a formula: inverse formulae

o Cartesian graph

o Direct and inverse proportionality

o Linearity and non linearity

o How to plot errors on graph

o Graphical fit with the estimation of slope and its error

### 5. Describing motion

o Vectors: definition, sum and difference of vectors, decomposition along given directions

o Understanding speed: distance-time graphs

o Understanding acceleration: speed-time graphs

o Calculating speed and acceleration

### 6. Forces and motion

o Mass, weight and gravity

o Sliding, rolling friction, drag

o Falling and turning

o Terminal velocity

o Force, mass, acceleration

o Action and reaction

o Moving in circles

o The idea of momentum

### 7. Turning effects of forces

o Centre of mass

o The moment of a force

- o Calculating moments
- o Stretching and compressing
- o Lever of different classes
- o Equilibrium: stable, unstable, neutral

#### 8. Forces and matter

- o Forces acting on solids
- o Stretching springs
- o Hooke's law

#### 9. Pressure

- o Pascal's principle and Stevin's law, hydraulic jack
- o Pressure measurements: manometer
- o Atmospheric pressure: barometer
- o Archimedes' law

#### 10. Energy transformations and energy transfer

- o Forms of energy: energy store and transfer
- o Energy conversions
- o Conservation of energy: efficiency
- o Energy calculations

#### 11. Work and power

- o Doing work
- o Potential energy, kinetic energy and mechanical energy
- o The conservation of mechanical energy
- o Power o Calculating power

#### 12. Energy resources

- o The energy we use: renewables and non-renewables, wind and wave, biomass, fossil and nuclear fuels, geothermal energy
- o Energy from the sun

#### 13. The kinetic model of matter

- o States of matter
- o The kinetic model of matter: Brownian motion
- o Forces and the kinetic theory
- o Gases and the kinetic theory

### **INTEGRAZIONE E APPROFONDIMENTI DI FISICA**

- 1) Introduzione alla Fisica e al suo studio. Il metodo sperimentale. Il S.I. , grandezze fisiche derivate e sue unità di misura. Notazione scientifica.
- 2) valore più attendibile di una misura, errore di sensibilità dello strumento, errore assoluto, errore relativo e percentuale, scrittura di una misura.
- 3) Differenza tra grandezze scalari e vettoriali; i vettori e la loro somma. Regola del parallelogramma e metodo punta – coda; differenza tra vettori, prodotto di un vettore con uno scalare, scomposizione di un vettore e sue componenti; Il seno e coseno di un angolo. Prodotto scalare e vettoriale; regola mano destra
- 4) Forza elastica-legge di Hooke; Grandezze direttamente proporzionali : definizione, caratteristiche e grafici Laboratorio 1: legge di Hooke.
- 5) Scomposizione di un vettore su un piano inclinato; forza di attrito statico. condizioni di equilibrio su un piano inclinato con attrito. esercizi su piano inclinato con molla e attrito. Laboratorio 2: attrito statico